*REMARKS*

Applicants thank Examiner Fujita for her analysis and search as reflected in the Action dated May 15, 2008. With the accompanying amendments, and based on the following remarks, applicants would respectfully request withdrawal of the rejections and favorable reconsideration of applicants' invention.

It should be noted that claim 6 has been cancelled and the subject matter of claim 6 has been incorporated into amended claim 1.[i] Thus, claim 1 as amended now reads as follows:

1. A method of determining the orientation of an image comprising:

determining the orientation from direction and magnitude of normal vectors associated with local curvature in a set of points associated with a digital representation of said image by;

performing a first and second derivative vector computation for one or more pixels of said digital representation;

quantizing a direction and magnitude of the computed first and second derivative vectors;

weighted voting the quantized first and second derivative directions into analyzing coordinate system orientations to determine a maximum vote; and

selecting the image orientation having the maximum vote.

Because claim 1 now incorporates the subject matter of cancelled claim 6, the discussion hereinafter will reference the rejection of claim 6 is pointing out the patentability of claim 1.

With respect to the limitations of claim 6 now in claim 1, the Action states that the first step of the implementation (namely 'computing first and second derivative vectors') is disclosed in Sander, on page 839. Applicants respectfully but strenuously disagree that the reference teaches this step or that one of skill in the art would look to this reference. The paper by Sander et al is directed to extracting an analytic surface from image intensities. Two techniques are taught (abstract, problems 1 and 2). The first technique is to locally infer the analytic surface using fitting of parabolic quadric surface patches to edge data. The second technique is to refine the estimated local information to cope with realistic situations that are inherently noisy.

These techniques are substantially different from the technique of the present invention to infer the global orientation of an image using a voting strategy based on the ensemble of computed curvature vectors and their quantized orientation, and using the maximum vote to infer the orientation of an image.

So it is quite unexpected that the person skilled in the art would consult the paper by Sander, given that, as discussed above, it relates to an entirely different and distinct problem unrelated to the solution problem addressed and solution provided by the present invention. Moreover, even had one of skill in the art perchance consulted the Sander paper, he or she would not have found therein the implementation according to the present invention as set out in claim 1.

The implementation in Sander shows completely different approaches to achieve their goals than those of the present invention.

1. The claimed vector differencing is not disclosed in Sander; the passage referred to and the formula referred to by the Action in this regard do not relate to a vector differencing approach.
   The following is an explanation of what this passage and formula in Sander then actually refers to.

   The first goal in Sander was met using local parabolic quadrics that are parameterized by three parameters a, b, c (section V, Initial Local Estimates, formula 1) that are jointly determined by linear least squares minimization (section V, formula 2). The estimate of the differential structure at a point P was termed a chart at P and consists of the principal curvatures and directions there (section III Overview, par. 2), computed as a function of the parameters a, b, c, of the parabolic quadric (formulas in section V-B and V-C).
   In the present invention, no analytic assumption is made locally and the edge points are used directly in the estimation of the first and second (curvature) derivatives. No curve segment fitting or surface patch fitting is involved in this step, and Sanders computation of local curvature (section V, C, complete section)

using the Hessian of the local chart is different from the vector differencing approach that is created in the current invention.

2. The normalization $\|N(p,q)\|$ on page 840 of Sander is not a quantization but a normalization used when calculating the magnitude.
Furthermore the normalization relates to the magnitude, whereas in the present invention, the quantization of the orientation (not of the magnitude) is performed.

3. The paragraphs referred to with regard to voting (see last 4 sentences of page 7 of the office action) do not relate to voting.

The paragraphs cited against the claimed step of quantizing and the step of voting actually relate to entirely different steps, not those they were cited against, as will be set out below.

The second goal in Sander is to cope with unstable surface patch fitting results due to noise (p. 841 2nd col, par. 2). Sanders refines the local estimations using the paradigm of relaxation labeling techniques (p. 841, 2nd col., section VI, par. 2). This step is added independently in addition to the implementation for the first goal, and can be omitted in principle. More specifically, this step considers a contextual neighborhood around a point P (section VI, Refining Estimated Local Information, B.) that is used to steer the new computation of a new chart at a given point P from the local information in the contextual neighborhood (section VI, D. 1st par.), to obtain a better estimate of the local structure at P (section VI, D, 2nd par.), in the sense of delivering a more smoothed output. This estimate is then used to characterize the smooth surface patches by classifying the surface point P into elliptic, hyperbolic, of parabolic according to its Gaussian and mean curvatures. (section IV, fig. 5). ***No voting strategy*** is disclosed or implied in this refinement step to infer a global orientation of the image. The claimed voting strategy, in distinction, by its statistical nature, copes implicitly with noisy data. This because the majority of quantized orientations will determine the overall orientation of the image, and no smoothing of the local first or second (curvature) derivative vectors is needed.

Based on these remarks noting the differences of the invention as claimed over the prior art of records, applicants feel that claim 1 and its dependent claims 3-5, 7-9, 13, 15-16, and 22-23 are patentable, and applicants therefore request favorable reconsideration and allowance of the pending claims.

Respectfully submitted,

Phillip M. Pippenger, Reg. No. 46,055
LEYDIG, VOIT & MAYER, LTD.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6731
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)

Date: November 14, 2008

---

[i] Claims 18 and 19 have been cancelled herein and rewritten as claims 22 and 23, including the amendment indicated by the Examiner in the Action.